

ENGINEERING NOTE

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Department

Mechanical Engineering

Date

07/05/03Program - Project - Job: DesignWorks_Rock Trolley_Operation ProcedureTitle: **Rock Trolley General Operating Procedures**References:

Engineering Note	Serial # M8192
Drawing	25J890
Drawing	25J891
Drawing	25J897
Drawing	25J898
Drawing	25J899
Drawing	25J892
Drawing	25J893
Drawing	25J895
Drawing	25J896

General description

The rock trolley structure is comprised of four heavy duty machinery dollies supporting three parallel box beams, which are orthogonal to and support five parallel I-beams. These I-beams support a ½" steel plate with patterned rectangular cutouts. A Unistrut frame attaches to the structure at the trolley's leading edge.

The two layers of box and I-beams support two-axis bending from the rock's six-ton payload. The top plate distributes the payload weight to these beams, and partially supports torsional loading that can arise from out-of-plane machinery dolly displacements. Two of the machinery dollies are fixed and two swivel for steering; each has a capacity of 7500lb. The pallet can be lifted by the 4 hydraulic cylinders located at 4 points, between the machinery dolly attachment points (see Figure 1).

The payload rests atop the plate on a ½" thick neoprene rubber padding that can be cut into for underbelly access to the rock through the patterned cutouts. A Unistrut frame mounts forward of the trolley body and provides both forward support and tie down locations for the payload over the trolley's short travel distance.

Table 1. Trolley Characteristics

Length	48"
Width	48"
Height	13"
Gross weight	750 lb
Max payload capacity	12,000 lb
Hydraulic operating pressure	1700 psi @ Max Cap.

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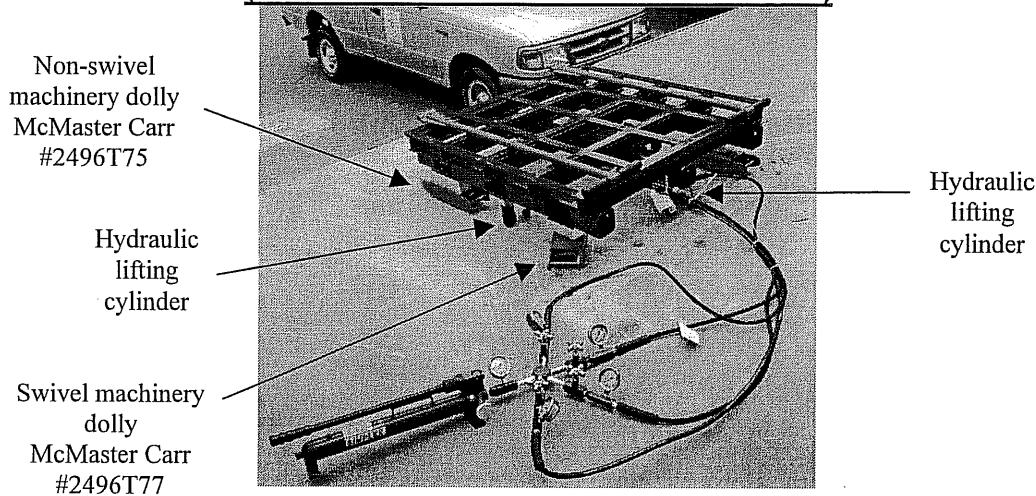
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Figure 1. Rock Trolley and hydraulic lifting system
(shown without front Unistrut frame)



Before you start

1. Always use flat sheets of aluminum or steel (1/2" or thicker) as a rolling surface for the trolley. Check the flatness of the ground under the metal plates. Although there is no flatness requirement, checking flatness of the ground and metal plate will let you know whether to expect rocking of the trolley. If the ground or plate is more than about 0.35 inch out-of-flat, only three machinery dollies will contact the rolling surface (if it is one of the steerable machinery dollies, it will not provide the expected steering). Rough flatness can be checked using a straightedge.
2. When the rock trolley is stationary, always use a braking system (such as wheel chocks) whether the pallet is loaded or not. The rock trolley has no brakes; at a weight of 750 lbs empty and 6 tons loaded, a runaway pallet can do a lot of damage. Do **not** use the hydraulic cylinders as brakes.
3. Check to make sure there are no kinks or leaks in the hydraulic lines before using the hydraulic system.
4. Check the oil level in the hydraulic system. Level should be about 0.25 to 0.5 inch from the fill hole. Use any brand DTE-light, ISO-32 or AW-32 machine oil for hand operated hydraulic pumps. (For a source of hydraulic fluid contact: Kimmerle Bros. (415) 431-1163)
5. Check welds periodically for cracks. Cracks may arise if the pallet is overloaded or payload is dropped onto pallet.
6. Double check tightness of bolts to the hydraulic cylinders and machinery dollies before use.

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7. Check the path in front of the wheels of the machinery dollies. A small rock can prevent the trolley from rolling.
8. The rock trolley may have difficulties rolling over a small curb. Check rolling path with the trolley unloaded to see if it will clear all bumps in the rolling path.

Operation (see Figure 3 for references to components)

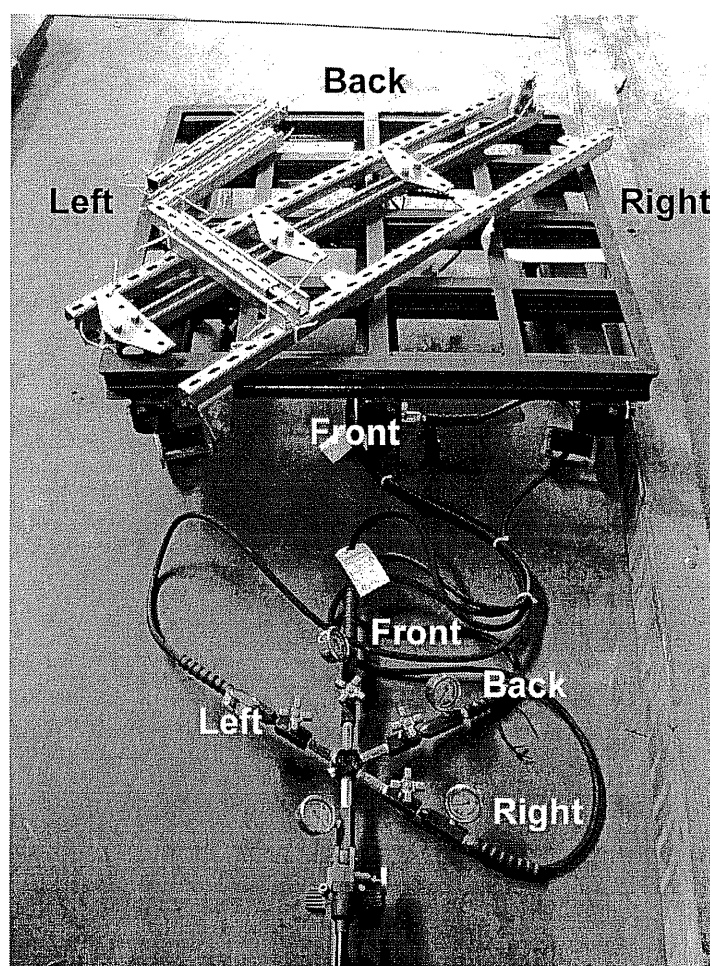
1. Make sure all hydraulic cylinders are fully retracted.
2. Fully **close** the Hydraulic Pump Valve (C). (see Figure 3)
3. Fully **open** all secondary valves. These are located between the Manifold (G) and the Hydraulic cylinders (A). (see Figure 3)
4. Use the Hand Operated Hydraulic Pump (C) to lift the pallet up.
NOTE: The pallet can be tilted or load leveled by selectively opening/closing secondary needle valves (see Figure 2 for valve layout).
5. **Close** all secondary valves to the hydraulic cylinders after load is supported.
6. Lower the pallet by **opening** all secondary valves **FIRST**, then **opening** the Hydraulic Pump Valve (C). When lowering a fully loaded rock pallet, release the hydraulic pressure **VERY SLOWLY**.
NOTE: The pallet may "tilt" when opening secondary valves if the pallet had been "load leveled", use caution and work slowly.
7. Use the orange "T" bars to move and steer the pallet. Steering the pallet using the rotating machinery dollies should be performed by a minimum of 2 people (one per wheel).

Cautions

1. The front Unistrut support is not designed to carry the full load of the 6-ton rock sample. The provided web strapping should be used to tie the rear corners of the rock pallet to the top of the Unistrut supports.
2. When rigging for a crane lift, lift the rock trolley by the lower box beams. The holes near the ends of the box beams may be used for lifting, or pass a sling completely through the interior of the beam. Make sure the load is balanced.
3. Over time the hydraulic cylinders may get sticky and not fully retract. The retraction is spring-actuated. Use a pry bar to retract the cylinders until they can be lubricated.
4. Both the machinery dollies and hydraulic cylinders should be removed once the rock pallet and its payload are accessible and can be moved with a forklift. This is the recommended handling procedure.

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Figure 2. Rock Trolley Hydraulic lifting system valve locations



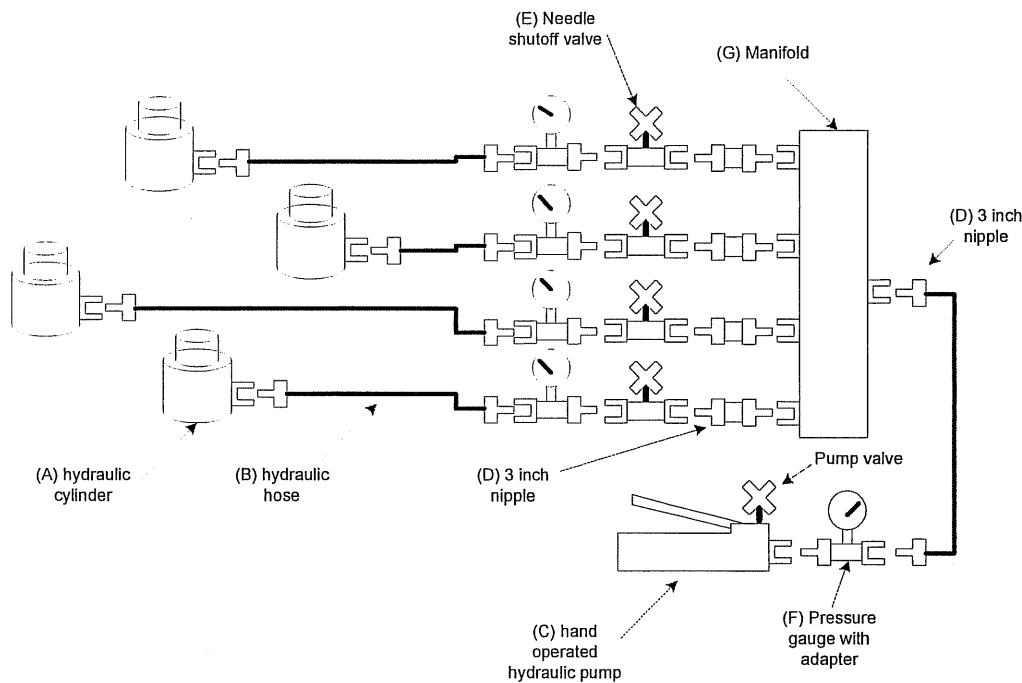
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07/05/03**Figure 3. Rock Trolley Hydraulic Configuration**

	Description	Qty	Catalog	Cat. Number	Inlet connection	Outlet connection	Features
(A)	Hydraulic cylinder	4	McMaster	2990T17	3/8 NPTF female	---	1.5" ram OD, 5.2 cu.in. oil capacity, 2.125" stroke
(B)	Hydraulic hose	5	McMaster	2916T5, -T8, -T9	3/8 NPT male	3/8 NPT male	Lengths variable
(C)	Hand operated hydraulic jack	1	McMaster	2992T15	--	3/8 NPT female	10,000 max pressure, 45 cu.in. capacity
(D)	3 inch nipple	5	McMaster	2983T35	3/8 NPTF male	3/8 NPTF male	
(E)	Needle shutoff valve	4	McMaster	2983T41	3/8 NPTF female	3/8 NPTF female	
(F)	Pressure gauge with adapter	5	McMaster	2965T5 +2965T7	3/8 NPTF male	3/8 NPTF female	0-10000 psi range
(G)	Manifold	1	McMaster	2983T33	3/8 NPT female	3/8 NPT female	6 ports

Pressure:

12,000 lbs = 3000 lbs per cylinder
 1.5 OD of ram = 1.767 sq. inch area per cylinder
 1700 psi needed to achieve 12,000 lbs

Oil:

5.2 cu. Inch per cylinder
 20.8 cu. Inch plus oil for hose, manifold, etc.